

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

**1-29 (canceled)**

**30. (new):** A sensor system for measuring the concentration, or indicating the presence or presence at a predetermined level of, a target contaminant species in an aqueous medium comprising a sensor element having a sample receiving area for receiving a sample of aqueous medium to be sampled and which comprises at least three electrodes each comprising a layer of metallic conductor comprising noble metals of high purity selected from the group consisting of silver, gold, platinum, and palladium in substantially pure form or as alloyed combinations thereof deposited upon an insulating substrate; and further comprising a power source adapted to apply a pre-determined potential difference across two of the electrodes, in use working and counter electrodes, determined by the potential associated with an electrochemical reaction characteristic of the target species, and output means to output data corresponding to the current generated thereby when a sample is in place in the sampling area; and further comprising a pH buffering agent and a reference reagent to be combined with a test solution when it is placed for testing on the sample collection area, the buffering agent being selected to adjust the pH of the sample to a value necessary for the characteristic electrochemical process to be tested and the reference reagent being selected to cause chloride ions to go into solution in the aqueous

medium sample to be tested to create a suitable reference solution for the characteristic electrochemical reaction.

**31. (new):** A sensor system in accordance with claim 30 wherein each electrode comprises a layer of metallic silver in substantially pure form, the reference reagent comprises sodium chloride, and the reference electrode thereby created in situ on the device in use comprises an Ag/AgCl (chloride) reference electrode.

**32. (new):** A sensor system in accordance with claim 31 wherein the buffering agent is selected to vary the pH of the initial solution to free into solution a species related to and indicative of the contaminant species under test, the characteristic electrochemical process to be tested by the sensor being one involving this related species.

**33. (new):** A sensor system in accordance with claim 30 adapted for an ammonium/ammonia ion target species wherein the reference reagent comprises sodium chloride and the buffering agent is selected to be such as in use to change the pH of the test solution in excess of 11.

**34. (new):** A sensor system in accordance with claim 33 wherein the buffering agent comprises  $\text{Na}_3\text{PO}_4$ .

**35. (new):** A sensor system in accordance with claim 30 adapted for nitrate/nitrite ion target species wherein the reference reagent comprises sodium chloride and the buffering agent is selected to be such as in use to change the pH of the test solution to about 6.8.

**36. (new):** A sensor system in accordance with claim 30 wherein the sensor electrode element is provided with a layer of a suitable chemical species deposited on the upper surface in the sample collection area such as to be rapidly and very soluble in the aqueous sample and placed thereon to effect formation of the said reference solution and/or buffering solution.

**37. (new):** A sensor system in accordance with claim 36 wherein the suitable chemical species is deposited directly on the electrode area to form a dry layer thereon.

**38. (new):** A sensor system in accordance with claim 36 wherein the system further comprises a matting layer applicable to the electrode surface during use and pre-impregnated with the suitable referencing and pH changing chemical species.

**39. (new):** A sensor system in accordance with claim 30 wherein a power source is integrated into a circuit with the sensor such that the sensor is caused to function as a potentiostat.

**40. (new):** A sensor system in accordance with claim 39 wherein the power source comprises control means such as to act in combination with the sensor to create a differential pulsed square wave voltammetric circuit.

**41. (new):** A sensor system in accordance claim 30 wherein the power source is a portable electrical power source for use in the field.

**42. (new):** A sensor system in accordance with claim 30 further comprising display means to display the output data in a user readable form.

**43. (new):** A sensor system in accordance with claim 30 wherein the insulating support substrate has hydrophobic surface properties to assist in the retention of a static sample in the sample collection area.

**44. (new):** A sensor system in accordance with claim 30 wherein the at least three electrodes are deposited on a single supporting substrate.

**45. (new):** A sensor system in accordance with claim 30 wherein at least some of the at least three electrodes are provided concentrically in the sample area.

**46. (new):** A sensor system in accordance with claim 45 wherein three electrodes are provided and the electrodes comprise a first electrode making up a central generally circular portion, and second and third electrodes concentrically annular or partially annular there around.

**47. (new):** A sensor system in accordance with claim 45 wherein four electrodes are provided and the electrodes comprise a first electrode making up a central generally circular portion, and second and third annular electrode portions concentrically annular or partially annular there around, wherein, one or other of the outer annular electrode areas is divided into two mutually insulating portions, to comprise two of the four electrodes.

**48. (new):** A sensor system in accordance with claim 30 wherein the sensor includes temperature measuring means and/or means to input a measured temperature at the time of sampling, and further comprises means to make a temperature compensation to raw output data based upon this temperature measurement relative to standard conditions.

**49. (new):** A sensor system in accordance with claim 30 wherein the sensor includes conductivity measuring means to measure solution conductivity, and further comprises means to make a compensation to raw output based upon this measurement relative to standard conditions if necessary.

**50. (new):** A method of measuring the concentration, or indicating the presence or presence at a predetermined level of a target contaminant species in an aqueous medium comprising the steps of:

applying a sample of aqueous medium to be tested on a sample collection area of a sensor element comprising at least three electrodes each comprising a layer of metallic conductor comprising noble metals of high purity selected from the group consisting of silver, gold, platinum, and palladium in substantially pure form or as alloyed combinations thereof deposited upon an insulating substrate;

combining the test solution with a pH buffering agent and a reference reagent, the buffering agent being selected to adjust the pH of the sample to a value acceptable and necessary for an electrochemical process to be tested characteristic of the target species and the reference reagent being selected to cause chloride ions to go into solution in the aqueous medium to be tested to create a suitable reference solution for the characteristic electrochemical process;

connecting the electrode to a power source to set up a control circuit;

applying a pre-determined potential difference determined by the potential associated with the electrochemical reaction characteristic of the target species;

awaiting the establishment of a quasi steady state;

outputting data associated with the current of said quasi steady state.

**51. (new):** A method in accordance with claim 50 wherein each electrode comprises a layer of metallic silver in substantially pure form, the reference solution comprises sodium chloride, and the reference electrode thereby set up in situ on the device in use comprises a Ag/AgCl (chloride) reference with sodium chloride.

**52. (new):** A method in accordance with claim 50 wherein sodium chloride is added to a solution concentration of about  $30 \text{ gl}^{-1}$ .

**53. (new):** A method in accordance with claim 50 for an ammonium/ ammonia ion target species wherein the method comprises adding a sodium chloride reference reagent and a buffering agent to change the pH of the test solution to in excess of 11.

**54. (new):** A method in accordance with claim 53 wherein the buffering agent comprises  $\text{Na}_3\text{PO}_4$ .

**55. (new):** A method in accordance with claim 50 for nitrate/ nitrite ion target species wherein the method comprises adding a sodium chloride reference reagent and a buffering agent to change the pH of the test solution to about 6.8.

**56. (new):** A method in accordance with claim 50 comprising the further steps of converting the said output current data into data indicative of the presence or presence at a pre-determined level and/or level of concentration of the target species in the sample;

and/or displaying the output data or converted data on suitable user readable display means;

and/or transmitting the output data or converted data to suitable data storage and/or processing means.

**57. (new):** A method in accordance with claim 50 wherein the said reference/ buffer reference solution is created by addition of a suitable reference reagent and buffering agent to the collected sample.

**58. (new):** A method in accordance with claim 50 wherein the sample collection area of the sensor element is first pre-prepared by provision of suitable chemical species deposited thereon in solid form and able to go into solution when the aqueous sample is applied thereto to effect formation of the reference solution and buffer solution in situ.